

LISTING OF THE PENDING CLAIMS

1. (Previously presented) A waveguide conversion device comprising:
a rectangular waveguide;
a circular waveguide connected to the rectangular waveguide; and
an unnecessary-wave suppression groove is provided in a mode conversion part between the rectangular waveguide and the circular waveguide, the unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the circular waveguide when signals are transmitted between the waveguides.
2. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is provided in either one or both of the rectangular waveguide and the circular waveguide and extends in a direction that is perpendicular to an electric field component of the unnecessary transmission mode.
3. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is provided in the rectangular waveguide at a position corresponding to an axis of the circular waveguide.
4. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is provided in the circular waveguide.
5. (Previously presented) The waveguide conversion device according to Claim 1, further comprising an alignment part provided between the rectangular waveguide and the circular waveguide to align the rectangular waveguide with the circular waveguide when the waveguides are connected to each other.

6. (Previously presented) A waveguide rotary joint comprising:

a first waveguide conversion device, the first waveguide device including a first rectangular waveguide, a first circular waveguide connected to the first rectangular waveguide, and a first unnecessary-wave suppression groove provided in a mode conversion part between the first rectangular waveguide and the first circular waveguide, the first unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the first circular waveguide when signals are transmitted between the first rectangular waveguide and the first circular waveguide; and

a second waveguide conversion device, the second waveguide device including a second rectangular waveguide, a second circular waveguide connected to the second rectangular waveguide, and a second unnecessary-wave suppression groove provided in a mode conversion part between the second rectangular waveguide and the second circular waveguide, the second unnecessary-wave suppression groove preventing an unnecessary transmission mode from being excited in the second circular waveguide when signals are transmitted between the second rectangular waveguide and the second circular waveguide,

wherein circular waveguides of the first and second waveguide conversion devices are disposed on a common axis and connected to each other so that the first and second circular waveguides are rotatable with respect to each other.

7. (Previously presented) An antenna device comprising:

the waveguide rotary joint according to Claim 6; and

a radiator for wireless communication connected to at least one of the first and second waveguide conversion devices.

8. (Previously presented) The waveguide conversion device according to Claim 1, wherein the rectangular waveguide transmits TE_{10} mode signals; and the circular waveguide transmits TM_{01} mode signals.

9. (Previously presented) The waveguide conversion device according to Claim 1, wherein the circular waveguide is connected to an H plane of the rectangular waveguide.

10. (Previously presented) The waveguide conversion device according to Claim 9, wherein the circular waveguide is connected to the rectangular waveguide at a right angle.

11. (Previously presented) The waveguide conversion device according to Claim 1, wherein the circular waveguide is connected to the rectangular waveguide at a right angle.

12. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary transmission mode is a TE_{11} mode.

13. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a length of one half or more than one half of a length of one wave of the signals transmitted between the waveguides.

14. (Previously presented) The waveguide conversion device according to Claim 5, wherein the alignment part is inserted into a part of the unnecessary-wave suppression groove when the rectangular and circular waveguides are connected to each other.

15. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a U-shaped structure.

16. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove has a rectangular cross-section.

17. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is disposed at a position corresponding to a 0-0 axis of the circular waveguide.

18. (Previously presented) The waveguide conversion device according to Claim 1, wherein the unnecessary-wave suppression groove is a first unnecessary-wave suppression groove, and the waveguide conversion device further comprises a second unnecessary-wave suppression groove provided at the mode conversion part between the rectangular waveguide and the circular waveguide.

19. (Previously presented) The waveguide conversion device according to Claim 18, wherein the second unnecessary-wave suppression groove is disposed at a position corresponding to the center 0 axis of the circular waveguide and intersects the first groove.

20. (Previously presented) The waveguide conversion device according to Claim 18, wherein the first unnecessary-wave suppression groove is U-shaped and the second unnecessary-wave suppression groove is L-shaped.